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# LOWER DEVONIAN STREPTELASMATID, LINDSTROEMIID AND POSSIBLE AMPLEXOCARINIID CORALS FROM VICTORIA

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## Abstract

Four new genera and eight new, or newly combined species are described and figured, their systematics and distribution being as follows:

Family Streptelasmatidae

*Streptelasma* (?) *vagans* sp. nov., late Gedinnian or Siegenian, Loyola, Vict.

Family Lindstroemiidae

*Haptophyllum erisma* (Hill) gen. nov., Emsian, Buchan, Vict.
*Taralasma radiatum* (Hill) gen. nov., Emsian, Buchan, Vict.
*Tanjilasma meridionale* (Philip) gen. nov., late Gedinnian or Siegenian, Tyers R., Vict.
*Metriophyllum devexicarinatum* sp. nov., late Gedinnian or Siegenian, Tyers R., Vict.
*M. solidum solidum* sp. et subsp. nov., Emsian, Buchan, Vict.
*M. solidum murrindalense* sp. et subsp. nov., Emsian, Buchan, Vict.
*Boolelasma pycnotheca* gen. et sp. nov., late Gedinnian or Siegenian, Tyers R., Vict.

Family Amplexocariniidae

*Amplexocarinia* (?) *fistella* sp. nov., late Gedinnian or Siegenian, Loyola, Vict.

## Introduction

The generally small and even minute size of the corals described in this paper denies them the opportunity of ever becoming conspicuous elements in the faunas of which they are part. In spite of this, much variation is displayed in their morphology and considerable interest is attached to their study.

In the past, the exceptionally long geological range of the genera with which the species were normally associated, especially, for example, *Metriophyllum*, inevitably had a diminishing effect on their importance as index fossils. But the discovery, in the Lower Devonian of Victoria, of four new genera, unknown in the Upper Silurian and Middle Devonian, suggests that some of these corals may yet play a role in the elucidation of Australian Devonian correlations.

Sincere gratitude is extended to Professor D. Hill, of the University of Queensland, for access to her library and coral collections; to Professor Philip, of the University of New England, for unpublished information concerning correlations by conodonts, and to Mr N. Petrasz, also of the University of New England, for assistance in the preparation of thin sections. The author alone, however, accepts responsibility for their orientation and final thickness. Costs incurred by field-work in Victoria have been born by the University of New England's Research Grant No. 120.

## Systematic Descriptions

The material described in this paper is registered in three institutions, which are subsequently abbreviated as follows:

GSV Geological Survey of Victoria, Melbourne
UM University of Melbourne
UNE University of New England, Armidale.

## Family STREPTELASMATIDAE Nicholson

1889 STREPTELASIMIDAE Nicholson in Nicholson and Lydekker, p. 297.
1922 STREPTELASMAIDAE Grabau (emend.), Grabau, p. 28 (incorrect emendation).
1927 STREPTELASMATIDAE Wedekind, p. 15.

## Genus **Streptelasma** Hall

1847 *Streptoplasma Hall*, p. 17, 49, 69-71 *(lapsus calami)*.
1847 *Streptelasma Hall*, legends Pl. 4, 12, 25.
1888 *Palaeocyathus* Foerste, p. 129.
1937 *Streptelasma* Cox, p. 2.

TYPE SPECIES (of *Streptelasma* by subsequent designation of Römer 1861, p. 19): *Streptelasma corniculum* Hall 1847, p. 69, Pl. 25, fig. 1, 'lower part of the rock' (Trenton Limestone), Trenton Falls, Middleville, Turin, Watertown 'and at numerous other localities', New York.

TYPE SPECIES (of *Palaeocyathus* by subsequent designation of Lang, Smith and Thomas 1940, p. 94): *Cyathophyllum australe* Foerste 1888, p. 128, Pl. 13, fig. 12-14, Silurian, Bowning Hill, N.S.W. This species has been redescribed by Hill (1940, p. 410, Pl. 12, fig. 18-23), who has chosen the specimen (British Museum (NH) R26519) figured in fig. 18, Pl. 12 of her work as lectotype, and may be either late Wenlockian or early Ludlovian.

REMARKS: Although the spelling *Streptoplasma* is repeated seven times in Hall (1847), it is clear from the etymological information given by him on page 17, that it is a *lapsus calami* for *Streptelasma*, which is so spelled in the plate legends.

The minimum stratigraphical range for *Streptelasma* is Trentonian to Wenlockian. Several corals have been described under this name from Lower and Middle Devonian beds in North America, Europe and Australia; however in no instance is the generic identification certain and some have already been removed to other genera.

### **Streptelasma** (?) **vagans** sp. nov.

(Pl. 14, fig. 4, 6, 7; Fig. 1 a-c)

? 1939a Gen. et sp. indet., Hill, Pl. 15, fig. 12.

NAME DERIVATION: L. *vagans* = wandering.

MATERIAL: Holotype and paratypes 1, 2, UNE F8959-F8961 respectively, collected by the author from the Loyola Limestone (late Gedinnian or Siegenian) at Griffith's Quarry, about 10 kilometres SW. of Mansfield, Vict. These have provided 4 thin sections.

The specimen figured by Hill (1939) is a transverse section, catalogued UM TS623, and if conspecific, would be an exact topotype.

DIAGNOSIS: Ceratoid tetracoral approximately 20 mm in length and 11 mm in maximum diameter. Septal stereozone variable, up to 2·5 mm wide. Major septa approximately 20 in number, typically twisted at the axis forming a weak structure with the strongly inclined and axially elevated tabulae. Minor septa extremely short, or absent. Dissepiments lacking.

DESCRIPTION: Ceratoid tetracoral; before sectioning the incomplete holotype was approximately 12 mm long and 11 mm in greatest diameter; the paratypes were

just as fragmentary. The calice would be steep sided and there would probably be an axial boss.

A peripheral stereozone of dilated septal ends is variably developed. In the available material a maximum thickness of 2·5 mm is reached on what is believed to be the counter side of the holotype; elsewhere the thickness is as little as 0·5 mm. Septa are in two very unequal series. The major taper abruptly inside the stereozone and most are twisted and deflected from the axis; a few somewhat dilated axial lobes are present in the axial region. Minor septa are either confined to the peripheral stereozone, or only just project into the lumen. There are no dissepiments.

Tabulae are incomplete, gently convex and prominently elevated in the axial region. A few short flat tabellae may be present at the margin of the tabularium.

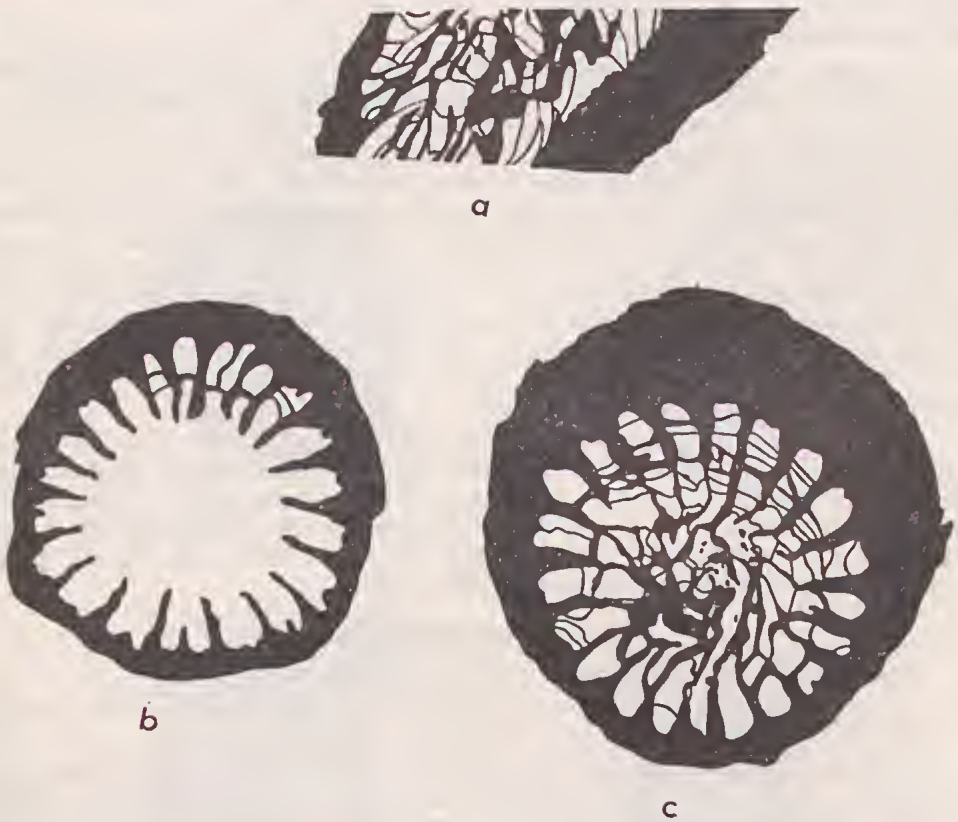


FIG. 1—*Streptelasma* (?) *vagans* sp. nov., × 5. (a) UNE F8959, holotype, longitudinal section; (b) UNE F8961, paratype, transverse section near base of calice; (c) UNE F8959, holotype, transverse section. Both from the Loyola Limestone near Mansfield, Vict.

REMARKS: The new species resembles *Streptelasma* more than most other Devonian species referred to the genus. However, the thickening of the peripheral stereozone on one side is an unusual feature, and is the reason for only doubtfully associating the species with it. Comparisons with other Lower Devonian species

are hampered in nearly every case by inadequacies in earlier descriptions. *S. cumberlandicum* Swartz (1913, p. 199, Pl. 18, fig. 1, 2) from Maryland, *S. armoricum* Le Maître (1934, p. 146, 147, Pl. 5, fig. 1, 2) from France and *S. devonicum* Chernyshev (1885, p. 62, 63, Pl. 7, fig. 103) from the W slope of the Urals are all much larger with many more septa.

## Family Lindstroemiidae Počta

1902 Lindströmidae Počta, p. 181, 182.
1925 Lindstroemiinae Chapman, p. 105 (as subfamily of the Cyathaxoniidae).
1928 Laccophyllidae Grabau, p. 82.
1928 Lindstroemiidae Počta, Grabau, p. 111 (justified emendation).
1939b Syringaxonidae Hill, p. 141, 142.
1939b Metriophyllidae Hill, p. 143.
1953 Stereolasmidae Fomichev, p. 96.
1965 Ditoecholasmatidae Sutherland, p. 35, 36.

Remarks: As will be evident from this synonymy, the present work is following Glinski (1963) and Fedorowski (1965) in reviving the name Lindstroemiidae for a broad generic assemblage approximating to the combined Laccophyllidae, Metriophyllidae and Syringaxonidae of other current workers (Prantl 1938; Stumm 1949; Schouppé 1954; Hill in Moore 1956; Philip 1962; Flügel and Free 1962; Oliver 1964; Sutherland 1965). But this must be regarded as a provisional measure, for no doubt, natural, or purely utilitarian groupings will be recognized within such a broad family. At the moment two factors are obscuring the taxonomy and limits of these groupings. Firstly, the original, or lectotypic specimens of such vital genera as *Syringaxon, Lindstroemia* and *Ditoecholasma* have not been adequately described, and secondly, there is evidence, particularly from the present study, that some supposedly diagnostic features, such as metriophylloid carinae, must have evolved independently in different lineages.

*Lindstroemia* Nicholson and Thomson (1876, p. 150), is somewhat vaguely known and there has been confusion concerning the type species, which as Willoughby (1938) points out, is *L. columnaris*. Despite uncertainties surrounding the species, interior figures, justifying the Lindstroemiidae as a broad generic assemblage, have been provided by Nicholson and Etheridge (1878, Fig. 4b, 4b′, p. 84) and are readily available in several subsequent works.

## Genus **Haptophyllum** nov.

Name Derivation: Gk, $\alpha\pi\tau o$ = touch, and $\phi\mu\lambda\lambda o\nu$ = leaf.

Type Species: *Metriophyllum erisma* Hill (*partim*). Holotype only, paratype = *Metriophyllum solidum* sp. nov., see below.

Diagnosis: Small solitary tetracoral with broad lamellar epitheca. Septa predominantly paired, commonly contratingent and bearing metriophylloid carinae. Normal dissepiments absent, but inwardly inclined plates are developed within the septal pairs (position 1 of Sutherland 1965). Tabulae descend steeply from the axis and are confined to loculi exterior of the septal pairs (position II of Sutherland).

Remarks: *Haptophyllum* is distinguished from *Metriophyllum* and *Metrionaxon*, both discussed later in the paper, by possession of paired septa enclosing axially sloping plates. The late Ludlovian genus *Petraia* Münster (1839, p. 42) is a small coral with contratingent septa, but lacks carinae and typically also tabulae (Sehindewolf 1931, p. 634). Compared with *Ditoecholasma* Simpson (1900, p. 200, 201, fig. 5, 6), another Ludlovian genus, *Haptophyllum* has carinae and lacks

an axial structure formed of lobed septal edges (Sutherland 1965, p. 36). *Saucrophyllum* Philip (1962, p. 172, 173, Pl. 22, fig. 1-8) from the early Ludlovian of Oklahoma and the latc Silurian or early Devonian, or both, of Victoria, is another somewhat similar genus, but in it the septa are again smooth and are commonly united forming a tabulate aulos.

### Haptophyllum crisma (Hill 1950)

(Pl. 14, fig. 5; Pl. 15, fig. 3, 5; Pl. 16, fig. 1, 5, 7; Fig. 2a-d)

1950 *Metriophyllum crisma* Hill *(partim)*, p. 142, Pl. 6, fig. 11 *(non* Pl. 6, fig. 12 = *Metriophyllum solidum).*
1964 *Metriophyllum crisma* Hill 1949 *(sic)*, Holwill, p. 120.

MATERIAL: Holotype, GSV 48901 (longitudinal section), collected by Curt Teichert in the 'lower Murrindal beds', one-half mile N of Buchan R. Bridge (locality 167 of Teichert and Talent 1958), Vict. In current stratigraphical terms the type horizon falls in the Emsian Taravale Formation.

Topotypes, UNE F8962-F8965, collected by G. M. Philip and the writer. These have provided 13 thin sections.

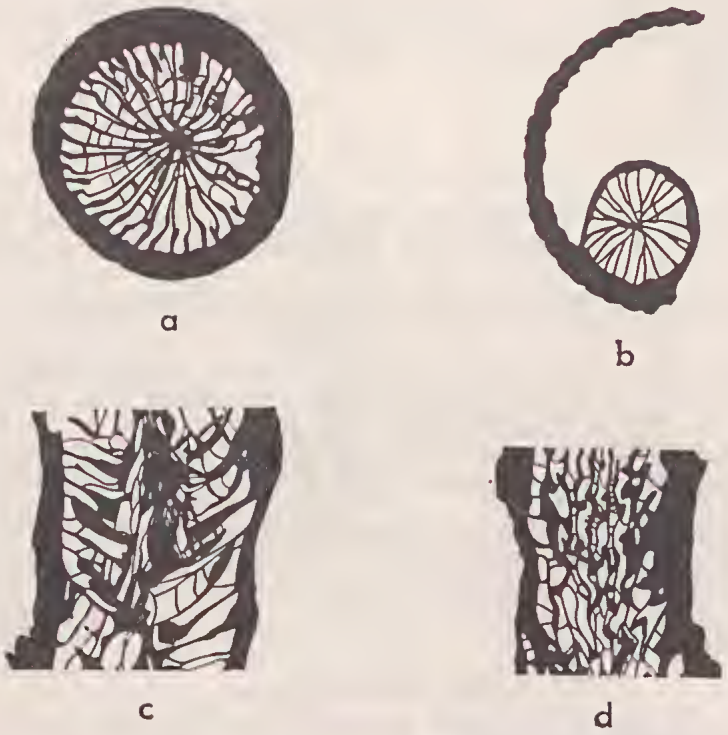


FIG. 2—*Haptophyllum crisma* (Hill) gen. nov., × 5. (a) UNE F8963, topotype, transverse section; (b) UNE F8964, topotype, transverse section of part of old calice and rejuvenated corallite; (c) UNE F8962, topotype, longitudinal section; (d) UNE F8962, topotype, tangential section. All from the Taravale Mudstone near Buchan, Vict.

DIAGNOSIS: Ceratoid to subcylindrical coral with maximum known diameter of 8·5 mm. Epitheca typically about 0·8 mm thick, maximum 1·3 mm. Septa mostly paired and commonly contratingent, varying in number from 33 to 43 in adult specimens. Carinae metriophylloid, inwardly descending, may mimic septa. Dissepiments absent, but axially inclined plates occur between the paired septa (position I). Tabulae confined to position II and exceptionally steeply inclined from the central region.

DESCRIPTION: Corallum solitary, ceratoid to subcylindrical; maximum observed length, which excludes both calice and proximal tip, 19·0 mm; maximum diameter 8·5 mm. Rejuvenescence of the type known in other lindstroemiids (Holwill 1964, Pl. 18, fig. 7; Fedorowski 1965, fig. 2f-h) is visible in UNE F8964.

Epitheca apparently lamellar, typically about 0·8 mm thick, locally increasing to 1·3 mm. Septa are normally paired and contratingent, the junction occurring at varying distances from the axis. Carinae are metriophylloid, inwardly sloping and may be sufficiently developed to mimic septa. In three topotypes septa are thin and several coalesce in the axial region, but in another (UNE F8965), they are thicker and form a rather dense axial structure. Septal counts with diameters given in mm are as follows:

| Specimen | Status | Mean diameter | No. of Septa |
|---|---|---|---|
| UNE F8964 | Topotype | 2·9 | 25 |
| UNE F8962 | ,, | 5·5 | 34 |
| UNE F8963 | ,, | 6·3 | 36 |
| UNE F8965 | ,, | 7·1 | 43 |
| UNE F8963 | ,, | 8·2 | 34 |

There are no normal dissepiments, but plates occur between the septal pairs (position I); these tend to slope inwards, but on the whole are not as inclined as the carinae.

Tabulae are normally less than 1 mm apart and are so steeply inclined from the axial region that they may be almost vertical in places.

REMARKS: There is no close resemblance between *Haptophyllum erisma* and any other described species. Phylogenetically it may have been derived from a *Metriophyllum* such as *M. devexicarinatum*, described later in this paper, but sloping metriophylloid carinae are not necessarily the monopoly of one lineage, and the origin of *Haptophyllum* may equally well lie with a coral having smooth paired septa.

Browne (1959, p. 121) has reported 'an abundance of a small zaphrentid coral, *Metriophyllum* sp. (cf. *M. erisma* Hill . . . .)' in the Waroo Limestone of the Taemas area, N.S.W. Specimens from this area and horizon have not been studied in connection with the present work and the reference has not been considered in the compilation of synonymies.

## Genus **Taralasma** nov.

NAME DERIVATION: Tara Creek, near Buchan, Vict., and Gk., ελασμα = plate; unusually elided for the sake of euphony.

TYPE SPECIES: *Syringaxon radiatum* Hill 1950, redescribed below.

DIAGNOSIS: Small solitary tetracoral. Septa smooth to weakly carinate, typically radially disposed and to some extent peripherally discontinuous; minor normally contratingent with the major. Imperfect aulos formed by dilation of the axial ends of

major septa. Dissepiments first appear in late neanic or early ephebic stages as plates between contratingent septa (position I), but ultimately are well developed between all septa. Tabulae generally flat within the aulos and descending from it.

REMARKS: Hill originally assigned the type species to *Syringaxon* Lindström (1882, p. 20), and Philip (1962, p. 173) has suggested that it might be related to *Saucrophyllum*. Neither of these authors was fully aware of the extent and nature of the dissepimentarium, which together with the discontinuity of the septa in the more marginal region of the coral, distinguish it from species of either *Syringaxon* or *Saucrophyllum*. We are here, of course, following only the conventional concept of *Syringaxon* (Butler 1935; Prantl 1938; Smith 1945), for at present there is no adequate figure of the interior of the original specimen of *Cyathaxonia siluriensis* McCoy (1850, p. 281; Sedgwick and McCoy 1851, p. 36; 1855, Pl. 1C, fig. 11), the type species of *Syringaxon*.

Early stages of *Taralasma* resemble mature specimens of *Barrandeophyllum* Počta (1902, p. 190, 191, Pl. 108, fig. 4, 5, 7, 10, 13, 19) and perhaps also the poorly described *Retiophyllum* Počta (1902, p. 180, 181, Pl. 108, fig. 6), but again, the discontinuity of the septa near the periphery and the opulence of the adult dissepimentarium distinguish the new genus.

*Catactotoechus* Hill (1954, p. 9, 10, Pl. 2, fig. 30-33; Pl. 3, fig. 31-38) from the Famennian of W.A. possess sporadic dissepiments, but these apparently never constitute a well developed dissepimentarium and there are no minor septa in the genus.

Certain aspects of the morphology of *Taralasma radiatum* recall the Polish Middle Devonian species *Blothrophyllum skalense* Gürich (1896, p. 173-176, Pl. 4, fig. 1, 7, 8). Dembińska-Różkowska (1949, p. 202, Fig. 11) and Fedorowski (1965, p. 346-348, Fig. 1E, Pl. 5, fig. 1-5) are in agreement with Gürich's generic assignment and Fedorowski goes further to recognize the Blothrophyllinae as a subfamily of the Lindstroemiidae. However, the similarity between *Blothrophyllum decorticum* Billings (1859, p. 130, Fig. 25), the Onondagan type species of the genus (Billings 1859, p. 129), and *B. skalense* is probably due to homeomorphy rather than phylogeny. In any case *Taralasma* is distinguished from either of these species by its contratingent septa and aulos.

**Taralasma radiatum** (Hill 1950)

(Pl. 15, fig. 1, 2, 4, 6, 7; Fig. 3 a-c)

1950 *Syringaxon radiatum* Hill, p. 144, Pl. 6, fig. 14, 15.

MATERIAL: Holotype and paratype, GSV 48113 (transverse section) and GSV 48910 (longitudinal section) respectively; both collected by Curt Teichert in the 'Lower Murrindal beds', one-half mile N. of Buchan R. bridge (locality 167 of Teichert & Talent 1958), Vict. In current terms these originated in the Emsian Taravale Formation.

Topotypes, UNE F8966, F8967, collected by G. M. Philip and the writer; both have been cut to produce a total of 6 thin sections.

DIAGNOSIS: Corallum typically ceratoid with maximum observed length and width approximately 40 and 14 mm. Epitheca with variable lamellar reinforcement, locally up to 1·3 mm thick. Septa smooth to weakly carinate, radially disposed, minor contratingent with the major; both orders may be discontinuous across the dissepimentarium. Adult septal counts 22 × 2 to 24 × 2. Imperfect aulos, with internal diameter 1·0 to 2·5 mm, formed of dilated septal ends. Dissepiments initially absent, first developed within septal pairs (position I), ultimately up to 5

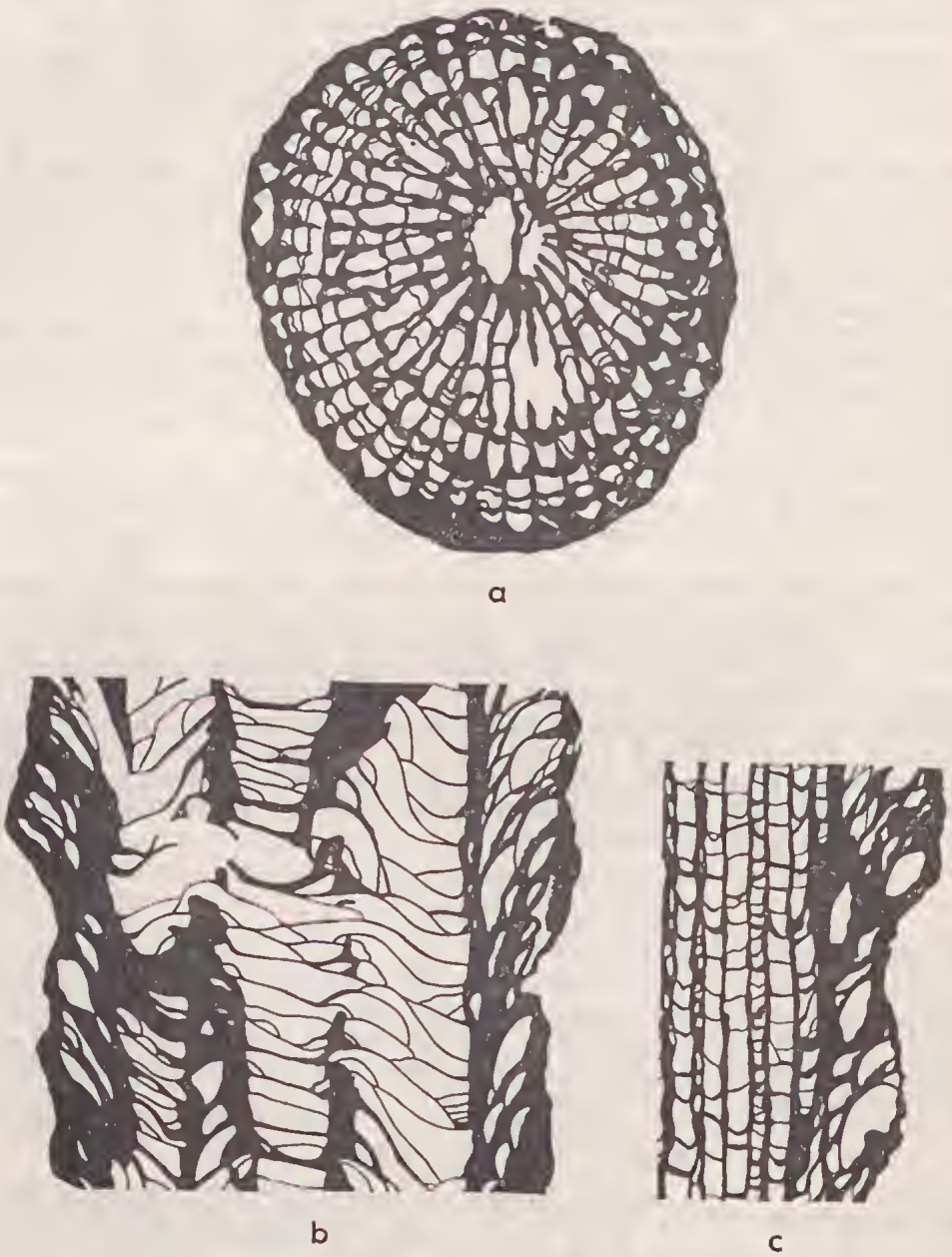


FIG. 3—*Taralasma radiatum* (Hill) gen. nov., × 5. (a) UNE F8966, topotype, transverse section; (b) UNE F8966, topotype, longitudinal section; (c) UNE F8966, topotype, part of a tangential section. Taravale Mudstone near Buchan, Vict.

deep between all septa. Aular tabulae generally flat; peripheral tabulae sigmoidal, outwardly inclined. Sclerenchyme commonly present on both dissepiments and tabulae.

DESCRIPTION: Corallum conical or ceratoid, less commonly subcylindrical, rejuvenated in some specimens. Large fragmentary specimens are 35 mm in length and 13 or 14 mm in diameter. Rugae and fine growth ridges mark the exterior, but the calice is unknown.

The epitheca may be thin, as in parts of UNE F8967, or as much as 1·3 mm in width, as in parts of UNE F8966, excess thickening being due to the presence of lamellar sclerenchyme at the periphery. Septa radially arranged, smooth to weakly carinate and differentiated into two orders; commonly they are discontinuous across the dissepimentarium and they may be slightly withdrawn from the periphery. Axial dilation of the major septa leads to the formation of an imperfect aulos, whose internal diameter varies between 1·0 and 2·5 mm. Minor septa are mostly contratingent with the major, the junction being situated in the outer part of the tabularium. Hill noted that in the paratype minor septa on either side of the counter septum are longer than others; this is also the case in UNE F8966, but not in other topotypes studied. Septal counts at diameters expressed in mm are as follows:

| Specimen | Status | Mean diameter | No. of Septa |
|---|---|---|---|
| GSV 48113 | Holotype | 10·0 | 24 × 2 |
| UNE F8966 | Topotype | 11·0 | 22 × 2 |
| UNE F8966 | ,, | 12·6 | 22 × 2 |
| UNE F8967 | ,, | 13·0 | 24 × 2 |

At first there are no dissepiments, but with the enlargement of the coral to a diameter of 7 mm or so, plates appear within the contratingent septa (position I). Higher these plates are replaced at the periphery by normal convex dissepiments, which are also introduced exterior of the septal pairs (position II), so that ultimately there is a continuous dissepimentarium. The dissepiments themselves are elongate, in a few cases lonsdaleoid, and most are invested with at least some sclerenchyme. In late stages, as seen for example in UNE F8966, the dissepimentarium may consist of as many as five rows of dissepiments and constitute one-third of the total radius of the coral.

The aular tabulae are typically complete and flat, and may be invested with sclerenchyme which merges with the wall of the aulos. Marginal tabulae are developed between different pairs of contratingent septa (position II) and descend towards the periphery in a graceful sigmoidal curve. A tangential section of UNE F8966 shows that plates in position I are more closely spaced than those in position II.

REMARKS: The presence of a well developed dissepimentarium with occasional lonsdaleoid dissepiments, in a second undoubted lindstroemiid, lends considerable support to the assignment of the next described species to the same family.

## Genus **Tanjilasma** nov.

NAME DERIVATION: County of Tanjil, Vict., and Gk., ελασμα = plate; again unusually elided in the interests of euphony.

TYPE SPECIES: *Tabulophyllum* (?) *meridionale* Philip 1962, see below.

DIAGNOSIS: Small solitary tetracoral with relatively broad lamellar epitheca. Septa smooth, well differentiated into two orders, commonly peripherally discontinuous or withdrawn; major septa typically dilated axially, forming an imperfect aulos, and in places contratingent. Dissepiments steep, elongate, some lonsdaleoid. Tabularium prominently elevated in the region of the aulos.

REMARKS: The morphology and geological occurrence of the original specimen suggested that it might be either an early *Tabulophyllum* Fenton and Fenton (1924, p. 30, 31) or a late *Kiphophyllum* Wedekind (1927, p. 19, 20). However a newly acquired topotype has a better developed aulos and more numerous septa and dispels any doubts of the species' place among the Lindstroemiidae.

REMARKS: Several of the differences between *Tanjilasma meridionale* and *Taralasma radiatum* are in degree only. The important distinction between the species, and for that matter the genera, is that in *Taralasma* the horizontal or subhorizontal elements in position I, differ from those in position II, whereas in *Tanjilasma* there is but one series of tabulae and dissepiments.

### Tanjilasma meridionale (Philip 1962)

(Pl. 14, fig. 8, 9; Fig. 4a, b)

1962 *Tabulophyllum* (?) *meridionale* Philip, p. 184, Fig. 6, Pl. 26, fig. 4, 5.

MATERIAL: Holotype, UM 3036, from which two thin sections have been prepared and registered UM TS1590, TS1591; collected by G. M. Philip in a limestone of the Coopers Creek Formation (late Gedinnian or Siegenian) on Tyers R. (locality 15 of Philip 1962), Vict.

The specimen illustrated in this paper, UNE F8968, is an exact topotype and was collected by G. M. Philip and the writer; it is also now reduced to two thin sections.

DIAGNOSIS: Corallum ceratoid to subcylindrical, greatest known diameter 15 mm. Epitheca lamellar with maximum thickness 1·2 mm. Septa smooth, strongly differentiated, commonly peripherally discontinuous, or withdrawn, and approximately 25 × 2 in number at maturity. Major septa dilated near the axis, locally contratingent forming an imperfect aulos. Minor septa rudimentary, mostly confined to the dissepimentarium. Dissepiments elongate, some lonsdaleoid, up to 6 deep. Tabulae incomplete, prominently elevated in the axial region.

DESCRIPTION: Corallum solitary, ceratoid to subcylindrical. The topotype, which was incomplete at both ends, was 18 mm long and 11·5 mm in mean diameter at the upper end; the holotype was a slightly larger specimen with a maximum diameter of 15 mm. The calice is unknown.

The epithica appears to be essentially a lamellar stereozone and is confluent with selerenchyme investing the bases of the septa and many of the dissepiments. It is 1·2 mm, or less, thick and bears prominent septal grooves and interseptal ridges; these have similar curvature, so that the exterior of the coral appears corrugated in transverse section. Septa are smooth and commonly withdrawn from the periphery, or discontinuous in the dissepimentarium. The major are dilated, and some are fused a short distance from the axis to form an irregular aulos. The minor are typically impersistent and confined to the dissepimentarium, a few join major septa just inside the margin of the tabularium, and in the topotype, those flanking the counter septum extend well into the tabularium. There are 24 ×2 septa at 11·5 mm diameter in the topotype and 25 × 2 at 14·00 mm in the holotype.

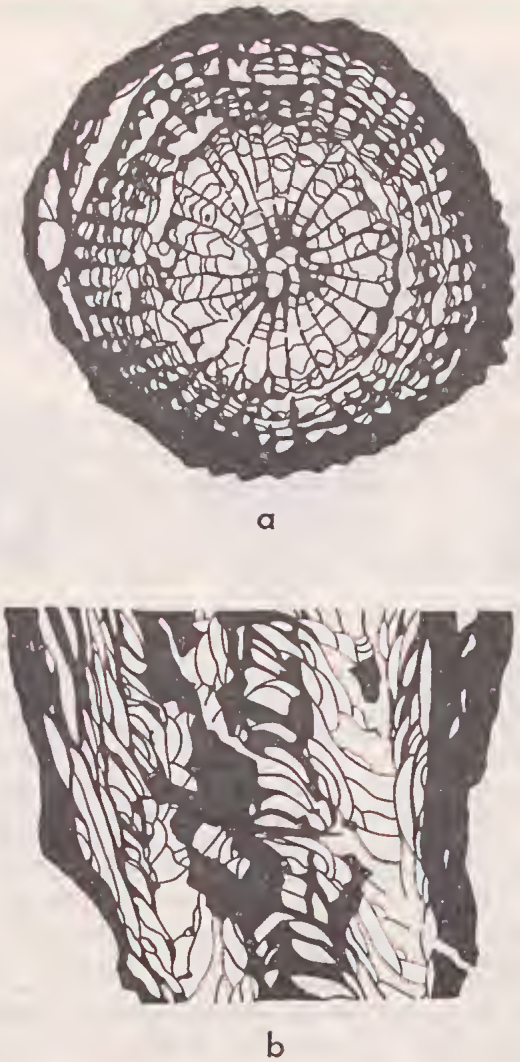


FIG. 4—*Tanjilasma meridionale* (Philip) gen. nov., × 5. (a) UNE F8968, topotype, transverse section; (b) UNE F8968, topotype, longitudinal section. Limestone in the Coopers Creek Formation, Tyers R., Vict.

Dissepiments are steeply inclined, elongate and in places lonsdaleoid; at the lower end of the topotype they are restricted to one or two rows, but higher in the corallite are 7 or 8 deep.

The tabulae are gently domed within the aulos, but immediately exterior of it are convex, steeply inclined, or even vertical, while towards the periphery they flatten considerably and may become concave.

Sclerenchyme commonly invests the axial terminations of the major septa as well as the aular tabulae.

## Genus **Metriophyllum** Milne-Edwards and Haime

1850 *Metriophyllum* Milne-Edwards and Haime, p. lxix.
1851 *Metriophyllum*, Milne-Edwards and Haime, p. 317, 318.
1900 *Lopholasma* Simpson, p. 206, 207, Fig. 19, 20.
1940 *Lophelasma* Lang, Smith and Thomas, p. 80 (unjustified emendation).
1964 *Metriophyllum* Edwards and Haime 1850, Holwill *(partim?)* p. 109-111 (includes *Metrionaxon*).

Type Species (of *Metriophyllum* by original designation): *M. bouchardi* Milne-Edwards and Haime 1850, p. lxix, *nomen nudum*, described 1851, p. 318, Pl. 7, fig. 1-2b, Ferques near Boulogne, France. Lang Smith and Thomas 1940, p. 84 have designated the coral figured in Pl. 7, fig. 1, 1a as lectotype. Rigaux (1892, p. 18) and other subsequent workers list this coral only from the Frasnian Beaulieu Shale and Ferques Limestone, but Holwill (1964, legends Pl. 16, 17) figures specimens stated to be from the Middle Devonian.

Type Species (of *Lopholasma* and *Lophelasma* by original designation): *Streptelasma rectum* Hall (*partim*) 1876, Pl. 19 (*non Strombodes* (?) *rectus* Hall 1843, p. 210, Fig. 87.5 = *Stereolasma rectum*, see Stumm and Watkins 1961, p. 445, 446, Pl. 58, fig. 1-16), Hamilton Group (Givetian) at several localities in New York. This species was named *L. carinatum* by Simpson 1900, p. 206 and syntypes were later figured by Holwill 1964, Pl. 16, fig. 1-3.

Remarks: The limits imposed on the genus in Holwill's (1964) useful review, would seem to be too broad in the light of Glinski's (1963) work. These authors have independently studied the primary material of *Metriophyllum laeve*, a species tentatively erected by Schlüter (1889, p. 20), and apparently unknowingly have arrived at very different conclusions, for whereas Glinski recognizes both *Syringaxon* and a new genus, *Metrionaxon*, in the material, Holwill believes that it includes merely the gerontic forms of *Metriophyllum gracile* Sehlüter (1884, p. 82, 83; 1889, p. 18-20, Pl. 2, fig. 5-8). Evaluation of such contrasting opinions is not possible at this distance, but as *Metrionaxon*, which is characterized by having metriophylloid carinae together with a tabulate aulos, has been found to be a usable genus in Poland (Federowski 1965, p. 340-342), it seems reasonable to continue its recognition, especially in view of the abundance of the Polish material.

Some Victorian specimens of *Metriophyllum*, particularly those of *M. solidum murrindalense*, are sufficiently similar to *Duncanella pontotocensis* Sutherland, (1965, p. 41, 42, Pl. 33, fig. 1-5; Pl. 34, fig. 8) from the Ludlovian of Oklahoma, to cast doubt on the validity of *Duncanella* Nicholson (1874, p. 333) as a distinct genus. The species referred to *Duncanella* in early literature (Nicholson 1874, p. 334, 335, Fig. a-e on p. 334; Sehlüter 1885, p. 6; 1889, p. 16-18, Pl. 2, fig. 9-15 and Girty 1895, p. 299, Pl. 2, fig. 7, 8) lack epitheeal cover on the apex. In *D. pontotocensis* this is a variable feature, and on the basis of the tangential figure (Sutherland 1965, Pl. 33, fig. 4b), the subhorizontal elements visible in longitudinal sections are metriophylloid carinae rather than tabulae. Such carinae were not described by Nicholson in *D. borealis*, the type species from the Waldron Formation (Ludlovian?) of Indiana, and Hill's (in Moore 1956, p. 257) diagnosis of the genus specifically notes that the septa are unflanged. Although *D. borealis* is yet another species in need of further study (Sutherland 1965, p. 41), at the moment there is insufficient evidence for regarding it as a synonym of *Metriophyllum*, which in any case would stand as the senior name.

**Metriophyllum devexicarinatum** sp. nov.

(Pl. 16, fig. 10, 11, 14, 16; Fig. 5a-c)

1962 *Syringaxon (Barrandeophyllum)* sp., Philip *(partim)*, p. 172 (one or two unfigured specimens only).

NAME DERIVATION: L. *devexus* = inclined, and *carinatus* = carinate.

MATERIAL: Holotype, UNE F8969, collected by G. M. Philip and the writer from a limestone in the Coopers Creek Formation (late Gedinnian or Siegenian) on Tyers R. (locality 15 of Philip 1962), Vict. Paratype, UM TS1186, TS1187 (same specimen), collected by G. M. Philip in the same limestone at his locality 20. UM TS1188, also collected by G. M. Philip from the same limestone (his locality 28), is probably another example of the species, but is not to be regarded as a paratype.

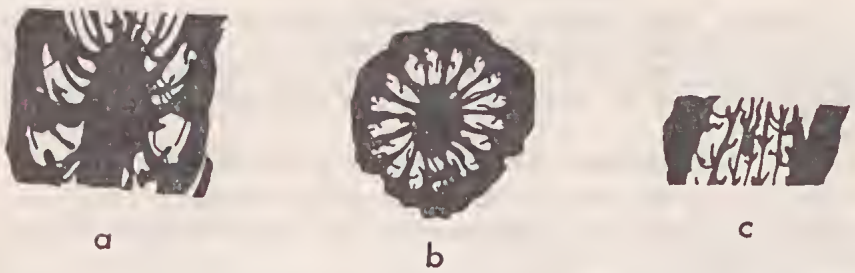


FIG. 5—*Metriophyllum devexicarinatum* sp. nov., × 5. (a) UNE F8969, holotype, longitudinal section; (b) UNE F8969, holotype, transverse section; (c) UNE F8969, holotype, tangential section. Limestone in the Coopers Creek Formation, Tyers R., Vict.

DIAGNOSIS: Small ceratoid coral with an approximate diameter of 5 mm. Epitheca relatively thick. Septa of one order only, axially fused, 18 in number in the holotype, and bearing inwardly sloping flange carinae. Dissepiments absent. Tabulae few and outwardly sloping.

DESCRIPTION: The holotype is an erect ceratoid coral approximately 5 mm in greatest diameter, and although lacking a proximal tip, was 14 mm in length before sectioning. Two transverse sections and one other, which due to movement along a styliolite, is partly longitudinal and partly tangential, have been prepared from it.

In transverse section the epitheca is corrugated and varies in thickness from about 0·5 to 1·0 mm; it is mainly constituted of lamellar sclerenchyme which not only embeds the septa, but also extends for some distance along their sides.

There is no indication of minor septa in either the lumen, or the fine structure of the epitheca. The major septa number 18 in both available sections and are dilated and fused at the axis forming a relatively stout pseudocolumella; flange carinae are well developed and are unusual in that they slope from the epitheca at about 45°. There are no dissepiments. Tabulae are few and are inclined steeply in the direction opposite to the carinae.

REMARKS: Several Devonian species referred to *Metriophyllum*, for example *M. elsii* Whidborne 1901, p. 538; *M.* (?) *irregulare* Paeckelmann 1921, p. 143-145, Pl. 3, fig. 15; *M. volki* Weissermel 1939, p. 361, 362, Pl. 14, fig. 8-10; *M. cruciferum* Weissermel 1941, p. 170, 171, Pl. 5, fig. 3, are too poorly known to allow comparisons. As far as the adequately described species are concerned, *M. devexi-*

*carinatum* is rendered almost unique by the inclination of the carinae; only *Duncanella* (?) *pontotocensis* Sutherland has similarly inclined carinae, but in that species they are much less prominent.

Six thin sections, from five specimens of the coral identified by Philip as *Syringaxon* (*Barrandeophyllum*) sp., have been studied in Melbourne. Three of these (UM TS1184, TS1185, TS1189) are probably conspecific, but in the absence of longitudinal sections, their generic identity remains conjectural. Another specimen (UM TS1188) bears carinae and further resembles the holotype of *M. devexicarinatum* in having 18 septa at 5 mm diameter, but as a transverse section only is available, firm identification is not possible. The fifth specimen has been cut to produce both transverse and longitudinal sections (UM TS1186, TS1187) and is beyond doubt a specimen of *M. devexicarinatum*; it is, in fact, designated a paratype.

**Metriophyllum solidum** sp. nov.

It is not clear at the moment whether differences between specimens from the Murrindal and Taravale Formations are due entirely to environmental factors, or whether they also reflect some temporal discrepancy. In any event two distinct communities appear to be represented, and it is proposed to erect two subspecies for them.

**Metriophyllum solidum solidum** sp. et subsp. nov.

(Pl. 16, fig. 2, 3, 8, 9, 12, 13, 17; Fig. 6a, b, d-f)

1950 *Metriophyllum erisma* Hill (partim), p. 142, Pl. 6, fig. 12 only (*non* Pl. 6, fig. 11 = holotype of *Haptophyllum erisma*).

NAME DERIVATION: L. *solidus* = solid.

MATERIAL: Holotype and paratypes 1-8, UNE F8970-F8978 respectively, collected by G. M. Philip and the author from the Taravale Mudstone (Emsian) at the entrance to Buchan Caves Reserve, Vict. Paratypes 9, 10, UNE F8979, F8980, collectors as above, Taravale Mudstone, 800 metres N. of Buchan River Bridge, Vict. (locality 167 of Teichert and Talent 1958).

The entire type series has been sectioned and now consists of 21 thin sections.

The specimens figured by Hill are mounted on a single slide, registered GSV 47904, and were collected by Curt Teichert from 'Lower Murrindal beds' in a cutting on the old road to S. Buchan, one-quarter mile S of Buchan (locality 3 of Teichert and Talent 1958); these beds now constitute part of the Taravale Mudstone and are also believed to be Emsian.

DIAGNOSIS: Ceratoid tetracoral, approximately 25 mm along the convex side and 4 to 5 mm in diameter. Epitheca lamellar. Septa of one order only, numbering 16 to 18 at maturity, initially dilated displacing the entire lumen and somewhat pinnate in arrangement, subsequently less dilated, except axially where dilation produces a prominent pseudocolumella. Flange carinae present. Dissepiments and tabulae absent.

DESCRIPTION: Corallum ceratoid, small; the holotype, which is the largest specimen yet seen, measured about 27 mm along the convex side and 5·2 mm in greatest diameter.

The fine skeletal structure of the epitheca is the same as that figured in the type species by Wang (1950, Pl. 4, fig. 5) and Holwill (1964, Pl. 16, fig. 6) and consists of lamellar tissue, which not only embeds the slender septal ends, but also extends for a short distance along the sides of the septa. The apex is missing from all the available specimens. In the earliest stages preserved, septa are greatly dilated, typically displacing the entire lumen, the cardinal septum is prominent and extends

beyond the axis while the adjacent septa are much shorter and either abut it, or are weakly pinnate about it. In later stages interseptal loculi appear and the symmetry of the septa becomes more or less radial, even though the cardinal septum may remain larger than others. Axial dilation produces a prominent pseudocolumella. There is no trace of septa in the most distal part of the calice. Well developed flange carinae occur in all specimens and slope towards the axis; in the only tangential section available (UNE F8972) they are developed on alternate surfaces of the septum. Septa are of one order, and number, at given diameters in mm, as follows:

| Specimen | Status | Mean diameter | No. of septa |
|---|---|---|---|
| UNE F8974 | Paratype 4 | 2·7 | 16 |
| UNE F8977 | „ 7 | 3·0 | 14 |
| UNE F8973 | „ 3 | 3·5 | 15 |
| UNE F8979 | „ 9 | 4·0 | 16 |
| UNE F8973 | „ 3 | 4·1 | 16 |
| UNE F8977 | „ 7 | 4·1 | 17 |
| UNE F8974 | „ 4 | 4·2 | 18 |
| UNE F8979 | „ 9 | 4·3 | 16 |
| UNE F8976 | „ 5 | 4·5 | 18 |
| UNE F8971 | „ 1 | 5·0 | 18 |

There are no dissepiments, and tabulae, if present at all, are extremely rare.

REMARKS: *Metriophyllum gracile* Schlüter, from the German Eifelian, is comparable in size (provided *M. laeve* is not admitted into synonymy—see under *Metrionaxon*), but has finer septa and tabulae. Attachment grooves, which occur on as many as two-thirds of the specimens of *M. gracile* at one locality (Holwill 1963), have not been observed on *M. solidum*.

*M. deminutivum* Easton (1944, p. 31, 32, Pl. 3, fig. 1-3) from the Chouteau Limestone of Missouri is also of similar size; however in that species the septa are unusually grouped, as well as being less dilated in early stages.

The pronounced pseudocolumella and virtual absence of tabulae in *M. solidum solidum* recall *M. tullium* (Williams), from the late Givetian or early Frasnian Tully Formation of New York (Cooper and Williams 1935, p. 837, 838, Pl. 58, fig. 1, 2, 5, 9) and Pennsylvania (Willard 1937, p. 1249, Pl. 2, fig. 16, 28). But the Tully species is larger, and is provided with about 20 slender septa.

**Metriophyllum solidum murrindalense** sp. et subsp. nov.

(Pl. 16; fig. 4, 6; Fig. 6c)

? 1958 single corals, Teichert and Talent *(partim)*, stratigraphical column in Pl. 1, fig. 4.

NAME DERIVATION: Murrindal R., near Buchan, Vict.

MATERIAL: Holotype and paratypes 1-3, UNE F8981-F8984 respectively, collected by the writer approximately 175 ft below the top of the Murrindal Limestone (Emsian) on McLarty's Ridge section, Vict. Teichert and Talent (1958, Pl. 1, fig. 4) reported 'single corals' from this horizon.

These specimens are now reduced to 8 thin sections.

DIAGNOSIS: Subspecies distinguished from the nominate subspecies in details of size, septa, carinae and tabulae, the greatest known diameter being 7·5 mm and the maximum number of major septa 19 (5·2 and 18, respectively, in *M. solidum solidum*). Minor septa are well developed in late stages and the carinae typically

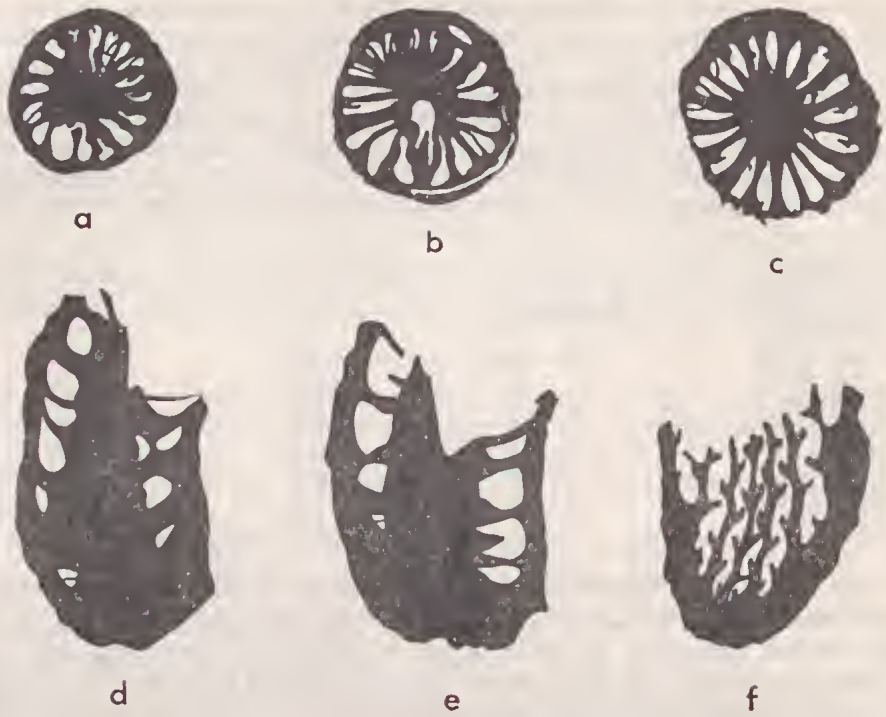


FIG. 6—(a, b, d-f) *Metriophyllum solidum solidum* sp. et subsp. nov., × 5. (a, b) UNE F8979, paratype, transverse sections; (d) UNE F8975, paratype, longitudinal section; (e) UNE F8972, paratype, longitudinal section; (f) UNE F8972 paratype, tangential section. All from the Taravale Mudstone, near Buchan, Vict. (c) *Metriophyllum solidum murrindalense* sp. et subsp. nov., × 5. UNE F8982, paratype, transverse section. About 175 feet below the top of the Murrindal Limestone, near Buchan, Vict.

bridge the loculi between them and the major septa. The carinae thus simulate tabulae, which may also be present, but are distinguished by their free inner margin and much greater thickness.

REMARKS: As intimated in the discussion of the genus, there is an unmistakable similarity between this subspecies and *Duncanella* (?) *pontotocensis* Sutherland. However the new subspecies is larger and has more numerous and more dilated major septa as well as longer minor septa.

*M. delawarense* Baker (1945, p. 141, Pl. 3, fig. 9-11) from the Frasnian of Ohio, is similar in size, but in it, the septa are only 12 in number at 7 mm diameter, are undilated, and produce an inconspicuous columella.

## Genus **Boolelasma** nov.

NAME DERIVATION: Parish of Boola Boola, Vict. and Gk, ελασμα = plate.

TYPE SPECIES: *Boolelasma pycnotheca* gen. et sp. nov., described below.

DIAGNOSIS: Small solitary tetracoral with relatively broad lamellar epitheca. Septa contratingent, united axially forming a regular narrow aulos, which may

become breached in latest stages. Metriophylloid carinae sporadically developed. Tabulae flat in aulos, inwardly sloping between them (position II).

REMARKS: The narrow aulos is identical with that found in the Middle Devonian genus *Metrionaxon* (Gürich 1896, Pl. 4, fig. 3; Sobolev 1904, Pl. 5, fig. 5; Pl. 7, fig. 2, 3; Glinski 1963, Fig. 1-3, Pl. 45, fig. 1, 2; Fedorowski 1965, Fig. 1B, Pl. 1, fig. 5-8; Pl. 3, fig. 1, 2; Pl. 4, fig. 1). In other respects resemblance between the genera is rather superficial, since in *Boolelasma* the septa are consistently contratingent and the peripheral tabulae fall into two series of opposite inclination.

*Haptophyllum*, described earlier in this work, is distinguished mainly by the absence of an aulos, but also by more abundant carinae.

*Barrandeophyllum* Počta (1902, p. 190, 191, Pl. 108, fig. 4, 5, 7, 13, 19) and the similar, if not synonymous, genus *Saucrophyllum* Philip (1962, p. 172, 173, Pl. 22, fig. 1-8) are differentiated by the complete absence of carinae.

Transverse sections of *Schindewolfia*, proposed by Weissermel (1943, p. 24-26, Pl. 3, fig. 3-6) as a subgenus of *Lindstroemia*, suggest a similarity between it and the new genus. However there are no carinae in *Schindewolfia*, and if Weissermel's interpretation of the type species is correct, connections visible between the septa are threads rather than dissepiments or tabulae.

**Boolelasma pycnotheca** sp. nov.

(Pl. 16, fig. 15, 18-21; Fig. 7a-c)

NAME DERIVATION: Gk., $\pi\upsilon\kappa\nu\alpha\varsigma$ = thick, and $\theta\varepsilon\kappa\varepsilon$ = sheath.

MATERIAL: Holotype and paratypes 1-3, UNE F8985-F8988 respectively, collected by G. M. Philip and the author from a limestone in the Coopers Creek Formation (late Gedinnian or Siegenian) at Philip's (1962, p. 125) locality 15 on Tyers R., Vict. The entire type series has been sectioned and now consists of 7 thin sections.

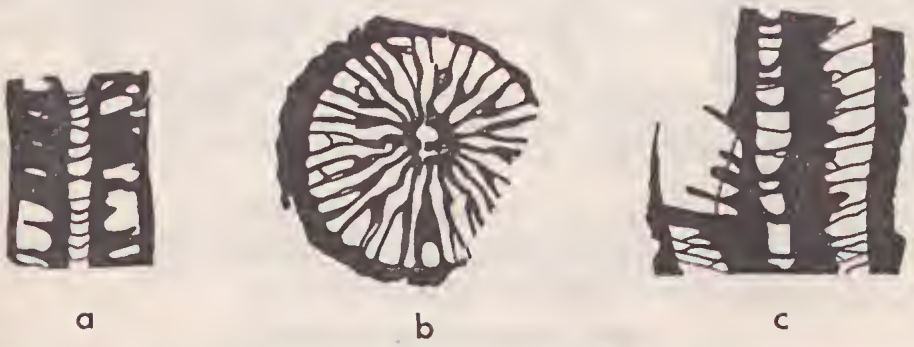


FIG. 7—*Boolelasma pycnotheca* gen. et sp. nov., × 5. (a) F8986, paratype, longitudinal section; (b) UNE F8985, holotype, transverse section; (c) UNE F8985, holotype, longitudinal section. Both from a limestone in the Coopers Creek Formation, Tyers R., Vict.

DIAGNOSIS: Ceratoid to subcylindrical tetracoral with adult diameter of about 5 to 7 mm. Epitheca lamellar, not known to exceed 1·2 mm in thickness. Septa normally contratingent, axially united to form a regular aulos, 18 or 19 in number at maturity. Metriophylloid carinae sparsely developed. Aular tabulae flat and

eommonly invested by sclerenehyme. Peripheral tabulae abundant and predominantly gently inelined towards the axis within pairs of contratingent septa (position I), and mueh less abundant and steeply inelined from the axis between them (position II).

Description: Corallum small, ceratoid to sub-eylindrieal with a deep parallel sided caliee. The largest of the four available speeimens (the holotype) although ineomplete at both ends, was 19 mm in length and 7 mm in diameter before seetioning. No details of the exterior were exposed, but undulations in the wall, seen in transverse seetion, indicate the presenee of longitudinal ridges.

The entirely lamellar wall is between 0·8 and 1·2 mm thiek and appears to merely toueh, rather than embed the septa. Throughout most of the eoral's development the septa are eontratingent, undifferentiated and are united towards the axis forming a regular aulos of 0·6 to 0·8 mm internal diameter. In latest stages, as in UNE F8988, the aulos may open, and it may be possible to distinguish major and minor septa. Metriophylloid earinae are developed sporadieally and typically just slope towards the axis. Septal eounts at given diameters expressed in mm are as follows:

| Specimen | Status | Mean diameter | No. of septa |
|---|---|---|---|
| UNE F8986 | Paratype 1 | 3·5 | 16 |
| UNE F8985 | Holotype | 5·3 | 18 |
| UNE F8988 | Paratype 3 | 6·5 | 19 |
| UNE F8885 | Holotype | 7·0 | 19 |

Flat tabulae, averaging about 2 per mm are present in the aulos and are eommonly invested with selerenehyme which merges into the aular wall. Tabulae inside the paired eontratingent septa (position I) are as abundant as those in the aulos, and for the most part approximate in inelination to the earinae, although outwardly sloping plates may be present along the inner side of the interseptal loeuli. Exterior of the septal pairs (position II) tabulae are very mueh less abundant and where present slope steeply towards the periphery. Normal dissepiments are unknown in the speeies.

Remarks: The possibility of eonfusing *Boolelasma pycnotheca* with other deseribed speeies is remote, for as noted in the diseussion of the genus, similarity with other lindstroemiids, sueh as the two deseribed speeies of *Metrionaxon*, is superfieial.

## Family Amplexocariniidae Soshkina

1941 Amplexocarininae Soshkina in Soshkina, Dobrolyubova and Porfirev, p. 92 (as subfamily of the Polycoelidae).
1965 Amplexocariniidae Różkowska (in MS) Fedorowski, p. 350.

## Genus **Amplexocarinia** Soshkina

1922 *Depasophyllum* Grabau, p. 21, 22 *(nomen nudum).*
1928 *Amplexocarinia* Soshkina, p. 379.
1936 *Depasophyllum* Grabau, p. 43, 44.
1940 *Amplexicarinia* Lang, Smith and Thomas, p. 16 (unjustified emendation).
1949 *Depasophyllum* Grabau, Stumm, p. 30.
1963 *Amplexocarinia* Soshkina, Smith and Thomas, p. 161, 162.
*non* 1934 *Depasophyllum* Yü, p. 19, 23, 24, 85, 86 (type species not fixed).

Type Species (of *Amplexocarinia* and *Amplexicarinia* by original designation): *Amplexus* (*Amplexocarinia*) *muralis* Soshkina 1928, p. 379, 380, Fig. 19a-f. Lower Permian (Artinskian), Shehughor R., N. Urals.

TYPE SPECIES (of *Depasophyllum* by original designation): *D. adnetum* Grabau 1936, p. 44. Traverse Group (Givetian) of Michigan, and Onondaga Limestone (Eifelian) of New York. Figures and descriptions of syntypes and hypotypes from the Four Mile Dam Formation are given by Ehlers and Stumm 1949, p. 30, 31, Pl. 2, fig. 4-9; Pl. 8, fig. 11-15. The reported Onondagan occurrence remains unsubstantiated.

REMARKS: As far as the present record is concerned, the genus first appears in Victoria in beds of probable Siegenian age. It then reappears in the Eifelian and Givetian, including the Tully Limestone of possible early Frasnian age, in North America and Europe (Grabau 1936; Stumm 1960; Smith and Thomas 1963), and again in the late Tournaisian of England (Smith 1955) and Montana (Sando 1960) and the late Viséan of Queensland (Hill 1934, Pl. 11, fig. 12-29). In its final appearances during the Pennsylvanian and Permian *Amplexocarinia* achieved an almost cosmopolitan distribution (Soshkina 1928, 1932; Heritsch 1936, 1937, 1939, 1941; Felser 1937; Moore and Jeffords 1945; Schouppé and Stacul 1959; Fontaine 1961; De Groot 1963).

In view of the breaks in this record, a polyphyletic origin for the species presently referred to *Amplexocarinia* seems highly probable. Accordingly, the brief synonymy given above should be regarded as provisional.


FIG. 8—*Amplexocarinia* (?) *fistella* sp. nov., × 5. (a) UNE F8989, holotype, transverse section; (b) UNE F8990, paratype, longitudinal section. Both from the Loyola Limestone near Mansfield, Vict.

**Amplexocarinia (?) fistella** sp. nov.

(Pl. 14, fig. 1-3; Fig. 8a, b.)

NAME DERIVATION: L., *fistella* = small tube.

MATERIAL: Holotype and paratype, UNE F8989, F8990 respectively, collected by the writer from the Loyola Limestone (late Gedinnian or Siegenian) at Griffith's Quarry, about 10 kilometres SW. of Mansfield, Vict. These are now represented by 4 thin sections.

DIAGNOSIS: Small ceratoid to scolecoid coral with maximum diameter approaching 8·5 mm. Epitheca 0·2 to 0·5 mm in width between septal bases. Septa 1·0 to

1·5 mm long, 23 to 24 in number. Aulos partly a cyathotheca, approximately 3 mm in diameter. Tabulae 1·0 to 2·5 mm apart, horizontal and complete in the aulos, but more abundant and outwardly inclined outside it.

DESCRIPTION: Both types were fragmentary and of the order of 15 mm in length when collected. Evidently there is variation in the growth for while the holotype is scolecoid and approximately 7·0 mm in diameter, the paratype is ceratoid and 8·3 mm in diameter at the greater end.

Various irregularities characterize the outer wall, which is typically 0·2 to 0·5 mm wide between the septal bases, and a prominent attachment process is present in the transverse section of the paratype. Although not well preserved in fine detail, the outer wall appears to be partly lamellar and partly due to expanded terminations of the septa. Septa are 1·0 to 1·5 mm in length and 23 or 24 in number, and unless occasional protruberances between them represent minor septa, are of one order only.

An aulos, approximating to 3 mm in diameter is present; generally it is of the type known as a cyathotheca (Grabau 1922, p. 21) and is formed of the descending parts of superposed pill-box tabulae, but locally, deflected septal ends are incorporated into its structure. The pill-box tabulae are essentially horizontal and in the axial region are from 1·0 to 2·5 mm apart. The outer tabulae are slightly more numerous and are inclined towards the periphery. There are no dissepiments.

REMARKS: *A.* (?) *tortuosa* (Philips 1841, p. 8, Pl. 3, fig. 8), from the Givetian of western and central Europe, generally possesses a narrower epitheca, shorter septa, and an aulos of relatively greater diameter. But as some specimens from Poland (Fedorowski 1965, Pl. 4, fig. 2, 4-6) approach, if not equal the new species in these respects, it is probably more reliably distinguished by a scolecoid, rather than ceratoid to subcylindrical growth form and by the exceptional irregularities in its epitheca.

Other Givetian species are less likely to be confused. The American *A.* (?) *adnetum* and *A.* (?) *tabulatum* (Stumm 1960, p. 162, Pl. 30, fig. 11-13), which is possibly early Frasnian, have uniformly shorter septa, besides the more regular form of their corallites. *A.* (?) *immissa* (Maurer 1885, p. 87-89, Pl. 1, fig. 19-20) from Germany, is a smaller species with only 18 septa.

*A. corrugata* (Mather 1915, p. 90, 91, Pl. 1, fig. 7-10; Cronies 1930, p. 84, Pl. 21, fig. 4, 5; Moore and Jeffords 1945, p. 142, Fig. 126-140), from the Lower Pennsylvanian of Oklahoma, Arkansas and Texas, is similar to *A.* (?) *fistella* in size and septal count, but the aulos is a true cyathotheca and no peripheral tabulae have been observed in the species.

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## Explanation of Plates

L.S. and T.S. are abbreviations used throughout for longitudinal and transverse sections respectively.

PLATE 14

All figures × 5

FIG. 1-3—*Amplexocarinia* (?) *fistella* sp. nov. (1) UNE F8989, holotype, L.S.; (2) UNE F8990, paratype, T.S.; (3) UNE F8989, holotype, T.S. Both from the Loyola Limestone, near Mansfield, Vict.

FIG. 4, 6, 7—*Streptelasma* (?) *vagans* sp. nov. (4) UNE F8959, holotype, T.S.; (6) UNE F8960, paratype, T.S.; (7) UNE F8959, holotype, L.S. Both from the Loyola Limestone, near Mansfield, Vict.

FIG. 5—*Haptophyllum erisma* (Hill) gen. nov., UNE F8964, topotype, T.S. From the Taravale Mudstone, near Buchan, Vict.

FIG. 8, 9—*Tanjilasma meridionale* (Philip) gen. nov. (8) UNE F8968, topotype, T.S.; (9) UNE F8968, topotype, L.S. Limestone in the Coopers Creek Formation, Tyers R., Vict.

PLATE 15

All figures × 5

FIG. 1, 2, 4, 6, 7—*Taralasma radiatum* (Hill) gen. nov. (1) UNE F8966, topotype, tangential section; (2) UNE F8967, topotype, L.S.; (4) UNE F8966, topotype, T.S.; (6) UNE F8966, topotype, L.S.; (7) UNE F8967, topotype, T.S. Both from the Taravale Mudstone, near Buchan, Vict.

FIG. 3, 5—*Haptophyllum erisma* (Hill) gen. nov. (3) UNE F8962, topotype, tangential section; (5) UNE F8962, topotype, L.S. From the Taravale Mudstone near Buchan, Vict.

PLATE 16

All figures × 5

FIG. 1, 5, 7—*Haptophyllum erisma* (Hill) gen. nov. (1, 7) UNE F8963, topotype, T.S.; (5) UNE F8962, topotype, T.S. Both from the Taravale Mudstone near Buchan, Vict.

FIG. 2, 3, 8, 9, 12, 13, 17—*Metriophyllum solidum solidum* sp. et subsp. nov. (2, 3) UNE F8974, paratype, T.S.; (8) UNE F8972, paratype, tangential section; (9) UNE F8973, paratype, T.S.; (12) UNE F8970, holotype, L.S.; (13) UNE F8975, paratype, L.S.; (17) UNE F8971, paratype, L.S. All from the Taravale Mudstone near Buchan, Vict.

FIG. 4, 6—*Metriophyllum solidum murrindalense* sp. et subsp. nov. (4) UNE F8981, holotype, T.S.; (6) UNE F8982, paratype, T.S. From 175 feet below the top of the Murrindal Limestone, near Buchan, Vict.

FIG. 10, 11, 14, 16—*Metriophyllum devexicarinatum* sp. nov. (10) UNE F8969, holotype, T.S.; (11) UM TS1187, paratype, near L.S.; (14) UNE F8969, holotype, L.S. above, and tangential section below styliolite; (16) UM TS1186, paratype, near T.S. Both from a limestone in the Coopers Creek Formation, Tyers R., Vict.

FIG. 15, 18-21—*Boolelasma pycnotheca* gen. et sp. nov. (15) UNE F8985, holotype, near T.S.; (18) UNE F8985, holotype, T.S.; (19) UNE F8986, paratype, L.S.; (20) UNE F8988, paratype, T.S.; (21) UNE F8985, holotype, L.S. All from a limestone in the Coopers Creek Formation, Tyers R., Vict.